REMARKS/ARGUMENTS

STATUS OF CLAIMS

Concurrently with filing of the RCE, claim 11 has been amended, claims 1-10 have been canceled, and claims 12-27 have been added. Claims 11-27 are now pending in this application. No new matter has been added.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 102 AND § 103

I. Claims 1, 3 and 5-7 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Yamashita (US 2002/0029746).

Claims 1, 3 and 5-7 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Horsky et al. (USPN 7,107,929).

Claims 1, 3 and 5-8 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Watababe et al. (US 2002/0132063).

Claims 1, 4, 8 and 9 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Cadieu (USPN 6,805,916.).

Claim 4 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamashita in view of Mizutani et al. (USPN 5,284,544).

Claim 10 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamashita in view of Mizutani et al., and further in view of Vaartstra (USPN 6,402,126).

The rejections are moot as to canceled claims 1 and 3-10.

II. Claim 11 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Morimoto et al. (USPN 4,559,901) in view of Dykstra (US 2002/162508).

In the Response to Arguments section on page 7 of the Office Action, the Examiner advises that the arguments filed May 11, 2007 are not persuasive, as claims 1 and 3-11 are apparatus claims and not method claims. The use of the metal cluster complex for generating the ion beam is the intended use of the apparatus.

To expedite prosecution, independent claim 11 has been amended to recite:

> A ***cluster*** beam apparatus, comprising:
> vaporization means for vaporizing or atomizing a metal cluster complex;
> ionization means for ionizing the vaporized or atomized metal cluster complex;
> acceleration means for accelerating the ionized metal cluster complex;
> convergence means for converging an orbit of a beam of the metal cluster complex accelerated ***by the acceleration means***; and
> scanning means for scanning with the beam of the metal cluster complex accelerated and converged, toward a substrate, by making the orbit of the beam to be curved.

Each of the recitations of claim 11 are means plus function recitations. The sixth paragraph of 35 U.S.C. § 112 permits an element in a claim for a combination to be expressed as a means or step for performing a specified function without recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. See ***In re Donaldson***, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994).

Thus, the recited vaporization means has the specific function "for vaporizing or atomizing a metal cluster complex', which must be considered in determining patentability of amended claim 11. As noted in the previous response, one of the features of the inventions

recited in amended claim 11 resides in that a metal cluster complex, ***which is a chemically stable compound***, is utilized for a cluster beam source. That is, the above feature of the inventions recited in amended claim 11 is that the beam source is already a cluster, but not a cluster that is formed in a gas phase.

A cluster ion beam is useful. However, although it is necessary to control the cluster ion beam to have a given cluster size, such controlling has been difficult with the conventional techniques. With the invention recited in amended claim 11, contrary to the conventional techniques, it is possible to obtain a cluster beam formed by the metal cluster complex molecules uniform in the cluster complex size by using, as a raw material of the beam, a chemically stable ***metal cluster complex***, which already has cluster structure in its solid state and can provide a sample (gas) uniform in cluster complex size of the resulting cluster complexes.

Generally, a cluster beam is intended to utilize a function as a plurality of clusters of atoms. This function is predominantly governed by cluster complex size in a molecular beam to be emitted. Thus, if the cluster complex has a distribution of cluster complex size, it hinders utilization of the cluster beam. Further, distribution of cluster complex size is based on the difference of the mass number of clusters contained therein. However, ***it is difficult to converge a beam that has such distribution of cluster complex size.*** This hinders the utilization of the cluster beam.

As explained above, when a metal cluster complex is utilized as a source for generating a molecular beam, i.e. a cluster ion beam (see page 21 in lines 10 to 11 of the present application), the metal cluster complex is released from the solid into a gas phase, while the unit structure of such a complex molecule is maintained. This is because ***the metal cluster complex molecule is***

chemically stable. As a result of this phenomenon, the resulting cluster complex size in the gas phase has no distribution.

Applicants submit that none of the applied prior art references cited by the Examiner discloses or suggest the above-mentioned ***utilization of a metal cluster complex as a cluster beam source***. In this regard, it should be noted that Morimoto et al. (USPN 4,559,901) uses MgF_2, ZnO, Si, Au, Ag, GaAs, BeO, GaP (col. 9, lines 48-53); and Dykstra (US 2002/162508) uses source 114 gases of Ar, inert gases, O_2, N_2, oxygen-bearing gases (e.g. CO_2), nitrogen-bearing gases, halogens, halogen-bearing gases (Fig. 1, paragraphs **[0005]**, **[0007]**). Therefore, Morimoto et al. and Dykstra do not disclose or suggest:

> vaporization means for vaporizing or atomizing ***a metal cluster complex***;
> ionization means for ionizing ***the vaporized or atomized metal cluster complex***;
> acceleration means for accelerating ***the ionized metal cluster complex***;
> convergence means for converging an orbit of a beam of ***the metal cluster complex*** accelerated by the acceleration means; and
> scanning means for scanning with the ***beam of the metal cluster complex*** accelerated and converged, toward a substrate, by making the orbit of the beam to be curved.

In view of the above, the allowance of amended claim 11 is respectfully solicited.

NEW CLAIMS

New claims 12-26 have been submitted.

New independent claim 12 delineates, *inter alia*:

> ...
> a vaporizing mechanism housed in the first conduit;

a metal cluster complex in the vaporizing mechanism as a vaporization material source;

..., wherein

the vaporizing mechanism vaporizes the metal cluster complex and discharges the vaporized metal cluster complex into the first conduit...

That is, a metal cluster complex is required to be in the vaporizing mechanism as a vaporization material source. This is not intended use, but a specific element of the claimed cluster beam apparatus.

New independent claim 13 delineates:

means for vaporizing or atomizing a metal cluster complex; and

means for ionizing the one of vaporized or atomized metal cluster complex.

That is, the function of the means for vaporizing or atomizing is to vaporize or atomize a metal cluster complex, and the function of the means for ionizing is to ionize the vaporized or atomized metal cluster complex.

New independent claim 20 delineates:

means for generating ionization energy; and

means for irradiating a metal cluster complex with the generated ionization energy to simultaneously vaporize and ionize the metal cluster complex.

New independent claim 22 delineates, *inter alia*:

...

a metal cluster complex in the atomizing mechanism as a mist material source; and

..., wherein

...

the atomized mechanism atomizes the metal cluster complex and discharges a mist of metal cluster complex into the second conduit...

That is, a metal cluster complex is required to be in the atomizing mechanism as a mist material source and the atomizing mechanism is required to atomize the metal cluster complex and discharge a mist of metal cluster complex into the second conduit.

None of these features recited in independent claims 12, 13, 20 and 22 is an intended use. Therefore, each must be considered in determining patentability of these claims. As none of the applied prior art references disclose or suggest, *inter alia*, the metal cluster complex recited in independent claims 12, 13, 20 and 22, independent claims 12, 13, 20 and 22, as well as dependent claims 14-19, 21 and 23-27, are patentable over the applied prior art references and their allowance is respectfully solicited.

CONCLUSION

In view of the above, applicant believe the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Edward J. Wise (Reg. No. 34,523) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

By _____

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